# Farm machinery costs and hiring charge rates

1988

## PREFACE

Since 1975, Alberta Agriculture has annually undertaken to provide information on the cost of owning and operating farm machinery.

This publication provides technical information on current machinery prices, repair rates, performance capacity, fuel consumption and price. The information is organized into fixed and variable costs to provide a basis for budgeting machinery costs. The cost calculations are intended to be used as approximate cost figures. It is recommended that adjustments be made as desired to suit individual situations. In addition, the 1987 custom rates have been included for comparison.

We gratefully acknowledge the services of Cal Ausenhus who again conducted the machinery cost survey. Connie Fisher and Garth Nickorick from the Farm Business Management Branch of Alberta Agriculture also contributed to updating this publication. The Market Rate Survey data was provided from a joint-project with Statistics Branch.

J. Wilson Loree, P.Ag., Head
Farm Business Management Branch
Box 2000, Olds, Alberta, T0M 1P0

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Copies of this publication may be obtained from:

Print Media Branch
Alberta Agriculture
7000 - 113 Street
Edmonton, Alberta
T6H 5T6

or

Alberta Agriculture's district offices

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## INTRODUCTION

Custom charges for farm operations can be arrived at in two ways:

1) Use the going rate for the job. The commercial market rates are surveyed and reported continuously by the Farm Business Management Branch. Relevant 1987 figures are listed in the "Market Rate" column of the cost tables in the text.
2) Determine the operating and ownership costs and set the rate at a level such that some or all of the costs plus profit are covered.

This publication outlines steps in the buildup of costs incurred by some of the machinery units used in field and livestock operations.

### ASSUMPTIONS

1) Estimated years of life, annual hours of use and annual repair rates are specified for each class of machine.
2) Interest on average machine investment is charged at 10% per year.
3) Diesel fuel is charged at $.15 per litre, purple gas at $.18 per litre and propane at $.18 per litre. (Changes in diesel and propane prices can be costed from the litres per hour usage estimates, then applied to total cost per hour).
4) Calculations follow the procedures on page 13 and the assumptions included on pages 15 and 16.

### FIXED COSTS

Hours of annual use have a major effect on fixed costs per hour. Three levels of annual use are listed for 2 WD tractors and combines, so as to guide realistic custom or rental pricing. The tractor costs associated with a 400 hour annual use are used in costing out all tractor driven operations. Substitute the 200 or 600 rates if they are more applicable.

If your annual use figures differ greatly from those listed, use this formula to adjust your Fixed Costs (FC) Per Hour:

$$\text{Your FC/HR} = \frac{\text{Quoted FC/Hr} \times \text{Quoted Annual Use In Hours}}{\text{Your Annual Use In Hours}}$$

### HOW TO USE THE GUIDE

1) If you are a full-time custom operator, then use the Total Machine Cost + Labor + Profit for estimating a charge. Be sure to adjust fixed costs if your annual hours of use differ much from those quoted. The profit margin can be adjusted to meet the market conditions.

2) If you are doing custom work on a good neighbor payment basis, then fixed costs of owning the machine may be ignored since they represent an annual cost incurred whether or not custom work is done. However, the rate should cover all variable costs which include an allowance for repairs. Labor and profit margin can be adjusted to meet each situation.

3) If you plan to do custom work in addition to your own work, so as to partly justify ownership of a larger machine, then the custom charge should cover variable costs, labor, a profit margin plus a proportion of fixed costs calculated as follows:

$$\text{Proportion of Fixed Costs} = \frac{\text{Hours of Custom Work}}{\text{Total Annual Hours of Use}} \times \text{Total Fixed Costs}$$

4) If you are renting out machinery, then you will wish to at least cover fixed costs and those variable costs such as lubrication and repairs which may not be already covered by the renter.
5) If you wish to assess a rate for a full operation such as silage making, which requires several machines, then add the hourly costs of each activity, making sure that there is neither omission nor duplication of men and units. Use worksheets on pages 13 and 14.
6) The purchase cost estimates are based on average cash prices as of February, 1988 for each class of machine. These represent current replacement costs which should be budgeted and charged for, even if you do custom work with older machines, unless the older machine will not do a comparable job.

## OTHER CONSIDERATIONS

1) Favorable or unfavorable working conditions such as size of job, distance, access, contour, soil type and possible down time, must modify the guide figures. Per hour charges allow for some of these situations.
2) Charges per unit of output such as per acre, per bushel or per bale, defined on work rates per hour, may be quite different from those quoted. Per hour charging overcomes some of these uncertainties.
3) You can adjust the labor charge according to your actual cost of hired work or the opportunity cost of your own labor.
4) If your experience and farm records suggest that other costs and assumptions would suit your situation, then recalculate using the worksheets.
5) Earlier and faster may be cheaper.
There are costs attached to late completion of operations. The rewards for timely quality work, quickly completed by large machines, is only earned if the support system, including seed and fertilizer supplies and grain trucking, is well organized.
6) Such factors as tax and equity in farm machinery influence costs, but are not considered here.

## OTHER INFORMATION SOURCES

Custom Rates Survey Summary-1988, Alberta Agriculture, Agdex 825-9, February 1988
Directory of Custom Operators in Alberta 1988, Alberta Agriculture, Agdex 825-17, February 1988
Know Your Farm Machinery Costs, Alberta Agriculture, Agdex 825-6, January 1984
Leasing vs. Buying Farm Machinery, Alberta Agriculture, Agdex 825-19, May 1985
Replacing Farm Machinery, Alberta Agriculture, Agdex 825-18, July 1983
What Is A Fair Charge For Custom Work?, Alberta Agriculture, Agdex 825-15, July 1983

## TRACTORS - 2WD

Years Life = 13
Annual Use = 200, 400*, 600
Annual Repair Rate = 3% of Replacement Cost

| | Annual Hours Used | Diesel Use litres/Hr | Current Replace Cost $ | Fixed Cost $/Hr | Variable Cost $/Hr | TOTAL Machine Cost $/Hr | Labor $/Hr | Profit $/Hr | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|
| 40 HP | 200 | 8 | 19000 | 12.75 | 2.80 | **15.56** | | | $.20 per PTO HP/HR |
| | 400 | | | 6.38 | | **9.18** | | | |
| | 600 | | | 4.26 | | **7.06** | | | |
| 60 HP | 200 | 13 | 24000 | 16.11 | 4.04 | **20.15** | | | |
| | 400 | | | 8.05 | | **12.10** | | | |
| | 600 | | | 5.37 | | **9.41** | | | |
| 80 HP | 200 | 17 | 30000 | 20.13 | 5.18 | **25.32** | | | |
| | 400 | | | 10.07 | | **15.25** | | | |
| | 600 | | | 6.71 | | **11.89** | | | |
| 100 HP | 200 | 22 | 53000 | 35.57 | 7.77 | **43.34** | | | $.18 per PTO HP/HR |
| | 400 | | | 17.79 | | **25.56** | | | |
| | 600 | | | 11.86 | | **19.63** | | | |
| 120 HP | 200 | 28 | 60000 | 40.27 | 9.33 | **49.60** | | | |
| | 400 | | | 20.13 | | **29.46** | | | |
| | 600 | | | 13.42 | | **22.75** | | | |
| 140 HP | 200 | 32 | 65000 | 43.63 | 10.40 | **54.02** | | | |
| | 400 | | | 21.81 | | **32.21** | | | |
| | 600 | | | 14.54 | | **24.94** | | | |
| 160 HP | 200 | 38 | 72000 | 48.32 | 11.96 | **60.28** | | | |
| | 400 | | | 24.16 | | **36.12** | | | |
| | 600 | | | 16.10 | | **28.06** | | | |
| 180 HP | 200 | 39 | 80000 | 53.69 | 12.73 | **66.42** | | | |
| | 400 | | | 26.85 | | **39.57** | | | |
| | 600 | | | 17.89 | | **30.62** | | | |

* This Annual Hours Use figure is typical.

Front wheel assist option at $9,000 - $12,000 adds $2.75 - $3.75 per hour to total machine cost.

Years Life = 13
Annual Use = 200, 400*, 600
Annual Repair Rate = 3% of Replacement Cost

## TRACTORS - 4WD

| | Annual Hours Used | Diesel Use litres/Hr | Current Replace Cost $ | Fixed Cost $/Hr | Variable Cost $/Hr | TOTAL Machine Cost $/Hr | Labor $/Hr | Profit $/Hr | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|
| | 200 | | | 53.69 | | 65.56 | | | |
| 175 HP | 400 | 34 | 80000 | 26.85 | 11.86 | 38.71 | | | |
| | 600 | | | 17.90 | | 29.76 | | | |
| | 200 | | | 64.43 | | 78.53 | | | |
| 220 HP | 400 | 40 | 96000 | 32.22 | 14.10 | 46.32 | | | |
| | 600 | | | 21.48 | | 35.58 | | | |
| | 200 | | | 66.44 | | 82.49 | | | |
| 250 HP | 400 | 50 | 99000 | 33.22 | 16.05 | 49.27 | | | |
| | 600 | | | 22.15 | | 38.20 | | | |
| | 200 | | | 78.53 | | 96.44 | | | $.18 per PTO HP/HR |
| 275 HP | 400 | 53 | 117000 | 39.26 | 17.92 | 57.18 | | | |
| | 600 | | | 26.17 | | 44.09 | | | |
| | 200 | | | 83.89 | | 103.27 | | | |
| 300 HP | 400 | 58 | 125000 | 41.95 | 19.38 | 61.33 | | | |
| | 600 | | | 27.96 | | 47.34 | | | |
| | 200 | | | 90.61 | | 111.43 | | | |
| 350 HP | 400 | 62 | 135000 | 45.30 | 20.82 | 66.12 | | | |
| *** | 600 | | | 30.02 | | 51.02 | | | |
| | 200 | | | 107.39 | | 134.05 | | | |
| 450 HP | 400 | 85 | 160000 | 53.69 | 26.66 | 80.35 | | | |
| *** | 600 | | | 35.80 | | 62.46 | | | |

* This Annual Hours Use figure is typical.

*** Priced without PTO.

## CULTIVATION EQUIPMENT

| Implement | Tractor HP | Current Replace Cost $ | POWER UNIT OR SP UNIT Fixed Cost $/Hr | POWER UNIT OR SP UNIT Variable Cost $/Hr | IMPLEMENT Fixed Cost $/Hr | IMPLEMENT Variable Cost $/Hr | TOTAL Machine Cost $/Hr | TOTAL Machine Cost Acre/Hr | TOTAL Machine Cost $/Acre | Labor $/ | Profit $/ | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PLOWS | | | Life = 15 | | Annual Hours Use = 150 | | Annual Repair Rate = 6% | | Replace Cost | | | |
| 3 X 16" 3 Point | 60 | 5000 | 8.05 | 4.04 | 4.17 | 2.00 | 18.26 | 2.0 | 9.13 | | | |
| 5 x 16" Semi 3 pt | 120 | 9000 | 20.13 | 9.33 | 7.50 | 3.60 | 40.56 | 3.0 | 13.52 | | | |
| 6 x 18" Trailing | 140 | 11500 | 21.81 | 10.40 | 9.58 | 4.60 | 46.39 | 4.0 | 11.60 | | | |
| 8 x 16" Trailing | 220 | 13500 | 32.22 | 14.10 | 11.25 | 5.40 | 62.97 | 6.0 | 10.49 | | | |
| 10 x 18" Trailing | 250 | 18000 | 33.22 | 16.05 | 15.00 | 7.20 | 71.47 | 7.0 | 10.21 | | | |
| HD CULTIVATORS W/ MULTIPLEX HARROWS | | | Life = 15 | | Annual Hours Use = 250 | | Annual Repair Rate = 6% | | Replace Cost | | | |
| 14' Single | 80 | 8500 | 10.07 | 5.18 | 4.25 | 2.04 | 21.54 | 7.0 | 3.08 | | | $3.50 - $7.00 per Acre |
| 22' Wing | 120 | 13000 | 20.13 | 9.33 | 6.50 | 3.12 | 39.08 | 11.0 | 3.55 | | | |
| 31' Wing | 160 | 20000 | 24.16 | 11.96 | 10.00 | 4.80 | 50.92 | 15.0 | 3.39 | | | |
| 42' Wing | 220 | 23000 | 32.22 | 14.10 | 11.50 | 5.52 | 63.34 | 20.0 | 3.17 | | | |
| 60' Wing | 350 | 32000 | 45.30 | 20.82 | 16.00 | 7.68 | 89.80 | 30.0 | 2.99 | | | |
| FIELD CULTIVATORS W/ MULTIPLEX HARROWS | | | Life = 15 | | Annual Hours Use = 250 | | Annual Repair Rate = 6% | | Replace Cost | | | |
| 16' Wing | 60 | 8500 | 8.05 | 4.04 | 4.25 | 2.04 | 18.39 | 8.5 | 2.16 | | | |
| 22' Wing | 80 | 11000 | 10.07 | 5.18 | 5.50 | 2.64 | 23.39 | 12.0 | 1.95 | | | |
| 32' Wing | 120 | 13000 | 20.13 | 9.33 | 6.50 | 3.12 | 39.08 | 17.0 | 2.30 | | | |
| 42' Wing | 160 | 18000 | 24.16 | 11.96 | 9.00 | 4.32 | 49.44 | 22.0 | 2.25 | | | |
| DISCS - TANDEM HD | | | Life = 15 | | Annual Hours Use = 150 | | Annual Repair Rate = 6% | | Replace Cost | | | |
| 16' Single | 100 | 11000 | 17.79 | 7.77 | 9.17 | 4.40 | 39.12 | 7.5 | 5.22 | | | $3.50 - $9.50 per Acre |
| 24' Wing | 140 | 22000 | 21.81 | 10.40 | 18.33 | 8.80 | 59.34 | 12.0 | 4.95 | | | |
| 30' Wing | 220 | 25000 | 32.22 | 14.10 | 20.83 | 10.00 | 77.15 | 16.5 | 4.68 | | | |
| 16' Heavy Offset | 140 | 18000 | 21.81 | 10.40 | 15.00 | 7.20 | 54.41 | 7.5 | 7.25 | | | |
| ROTOVATORS | | | Life = 15 | | Annual Hours Use = 100 | | Annual Repair Rate = 6% | | Replace Cost | | | |
| 5' Rotor | 80 | 10000 | 10.07 | 5.18 | 12.50 | 6.00 | 33.75 | 1.5 | 22.50 | | | |
| 6' Rotor | 120 | 14000 | 20.13 | 9.33 | 17.50 | 8.40 | 55.36 | 2.5 | 22.15 | | | |
| V-BLADE | | | Life = 15 | | Annual Hours Use = 150 | | Annual Repair Rate = 6% | | Replace Cost | | | |
| 21' | 100 | 14000 | 17.79 | 7.77 | 11.67 | 5.60 | 42.82 | 11.0 | 3.89 | | | |
| 28' | 160 | 17000 | 24.16 | 11.96 | 14.17 | 6.80 | 57.08 | 15.0 | 3.81 | | | |
| 42' | 250 | 25000 | 33.22 | 16.05 | 20.83 | 10.00 | 80.11 | 20.0 | 4.01 | | | |

400 Annual Hours of Tractor Use figures are used to determine above Power Unit Costs.

## CULTIVATING, SEEDING & SPRAYING EQUIPMENT

| Implement | Tractor HP | Current Replace Cost $ | POWER UNIT OR SP UNIT Fixed Cost $/Hr | POWER UNIT OR SP UNIT Variable Cost $/Hr | IMPLEMENT Fixed Cost $/Hr | IMPLEMENT Variable Cost $/Hr | TOTAL Machine Cost $/Hr | TOTAL Machine Cost Acre/Hr | TOTAL Machine Cost $/Acre | Labor $/ | Profit $/ | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROD WEEDER WITH MUTIPLEX HARROWS | Life = 15 | | Annual Hours Use = 150 | | | | Annual Repair Rate = 6% Replace Cost | | | | | |
| 24' | 100 | 9000 | 17.79 | 7.77 | 7.50 | 3.60 | 36.66 | 12.0 | 3.05 | | | |
| 36' | 120 | 12500 | 20.13 | 9.33 | 10.42 | 5.00 | 44.88 | 16.0 | 2.81 | | | |
| 48' | 160 | 18000 | 24.16 | 11.96 | 15.00 | 7.20 | 58.32 | 25.0 | 2.33 | | | |
| HARROWS | Life = 15 | | Annual Hours Use = 40 | | | | Annual Repair Rate = 2% Replace Cost | | | | | |
| Spring Tooth 50' | 80 | 7000 | 10.07 | 5.18 | 21.87 | 3.50 | 40.62 | 35.0 | 1.16 | | | $1.75 - $2.50 per Acre |
| Spring Tooth 70' | 120 | 9000 | 20.13 | 9.33 | 28.12 | 4.50 | 62.09 | 48.0 | 1.29 | | | |
| Harrow Packers 40' | 140 | 16000 | 21.81 | 10.40 | 50.00 | 8.00 | 90.21 | 25.0 | 3.61 | | | |
| Harrow Packers 70' | 180 | 21000 | 26.85 | 12.73 | 65.62 | 10.50 | 115.70 | 44.0 | 2.63 | | | |
| SEED DRILLS | Life = 15 | | Annual Hours Use = 100 | | | | Annual Repair Rate = 2% Replace Cost | | | | | |
| Press Drills 12' | 60 | 15000 | 8.05 | 4.04 | 18.75 | 3.00 | 33.85 | 6.5 | 5.21 | | | $5.00 - $8.00 per Acre |
| End Wheel 12' | 60 | 9000 | 8.05 | 4.04 | 11.25 | 1.80 | 25.15 | 6.5 | 3.87 | | | |
| Hoe Drill 12' | 60 | 15000 | 8.05 | 4.04 | 18.75 | 3.00 | 33.85 | 6.5 | 5.21 | | | |
| Zero/Min. Till 12' | 60 | 18000 | 8.05 | 4.04 | 22.50 | 3.60 | 38.20 | 4.5 | 8.49 | | | |
| AIR SEEDER WITH CULTIVATORS | Life = 15 | | Annual Hours Use = 150 | | | | Annual Repair Rate = 3% Replace Cost | | | | | |
| 28' | 140 | 33000 | 21.81 | 10.40 | 27.50 | 6.60 | 66.31 | 16.5 | 4.02 | | | $5.50 - $7.50 per Acre |
| 42' | 250 | 47000 | 33.22 | 16.05 | 39.17 | 9.40 | 97.84 | 25.0 | 3.91 | | | |
| 45' WITH PACK WHEELS | 250 | 62000 | 33.22 | 16.05 | 51.67 | 12.40 | 113.34 | 27.0 | 4.20 | | | |
| SPRAYER (TRAILER) | Life = 15 | | Annual Hours Use = 50 | | | | Annual Repair Rate = 3% Replace Cost | | | | | |
| 400 Gallon 68' | 60 | 8000 | 8.05 | 4.04 | 20.00 | 4.80 | 36.90 | 35.0 | 1.05 | | | $2.50 - $3.50 per Acre |
| 800 Gallon 80' | 60 | 11000 | 8.05 | 4.04 | 27.50 | 6.60 | 46.20 | 47.0 | 0.98 | | | |
| SPRAYER (SP) | Life = 10 | | Annual Hours Use = 100 | | | | Annual Repair Rate = 3% Replace Cost | | | | | |
| 130 Gallon 54' | 60 | 18000 | 27.90 | 5.40 | | | 33.30 | 40.0 | 0.83 | | | |
| 1000 Gal 54' Float | 160 | 110000 | 170.50 | 33.00 | | | 203.50 | 85.0 | 2.39 | | | |
| 320 Gallon 45' + 3/4 Ton 4x4 | 60 | 20000 | 31.00 | 6.00 | | | 37.00 | 35.0 | 1.06 | | | |

400 Annual Hours of Tractor Use figures are used to determine above Power Unit Cost.

## FORAGE EQUIPMENT

| Implement | Tractor HP | Current Replace Cost | POWER UNIT OR SP UNIT Fixed Cost | POWER UNIT OR SP UNIT Variable Cost | IMPLEMENT Fixed Cost | IMPLEMENT Variable Cost | TOTAL Machine Cost $/Hr | TOTAL Machine Cost Acre/Hr | TOTAL Machine Cost $/Acre | Labor $/ | Profit $/ | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $ | $/Hr | $/Hr | $/Hr | $/Hr | $/Hr | Acre/Hr | $/Acre | $/ | $/ | 1987 |
| SWATHER (SP) | Life = 15 | | Annual Hours Use = 100 | | | | Annual Repair Rate = 3% | Replace Cost | | | | |
| 16' Forage & Grain + Conditioner | 60 | 28000 | 35.00 | 10.64 | | | **45.64** | 7.0 | **6.52** | | | $4.50 - $6.00 per Acre |
| 20' Grain | 60 | 24000 | 30.00 | 9.44 | | | **39.44** | 10.0 | **3.94** | | | |
| SWATHER (PULL-TYPE) | Life = 15 | | Annual Hours Use = 100 | | | | Annual Repair Rate = 3% | Replace Cost | | | | |
| 15' Grain | 40 | 6500 | 6.38 | 2.80 | 8.13 | 1.95 | **19.26** | 7.5 | **2.57** | | | |
| 24' Grain | 60 | 8000 | 8.05 | 4.04 | 10.00 | 2.40 | **24.50** | 12.0 | **2.04** | | | |
| MOWER | Life = 15 | | Annual Hours Use = 50 | | | | Annual Repair Rate = 2% | Replace Cost | | | | |
| 7' | 40 | 4500 | 6.38 | 2.80 | 11.25 | 1.80 | **22.23** | 3.0 | **7.41** | | | |
| MOWER CONDITIONER | Life = 15 | | Annual Hours Use = 100 | | | | Annual Repair Rate = 3% | Replace Cost | | | | |
| 14' SP Diesel | 70 | 43000 | 53.75 | 15.72 | | | **69.47** | 7.0 | **9.92** | | | $7.00 - $9.00 per Acre |
| 9' PTO | 60 | 13000 | 8.05 | 4.04 | 16.25 | 3.90 | **32.25** | 5.0 | **6.45** | | | |
| 14' PTO | 80 | 18000 | 10.07 | 5.18 | 22.50 | 5.40 | **43.15** | 6.5 | **6.64** | | | |
| RAKE | Life = 15 | | Annual Hours Use = 50 | | | | Annual Repair Rate = 2% | Replace Cost | | | | |
| 9' Parallel Bar | 40 | 4000 | 6.38 | 2.80 | 10.00 | 1.60 | **20.78** | 5.0 | **4.16** | | | |
| FORAGE HARVESTER | Life = 12 | | Annual Hours Use = 100 | | | | Annual Repair Rate = 3% | Replace Cost | | | | |
| 20" | 120 | 18000 | 20.13 | 9.33 | 25.20 | 5.40 | **60.06** | | | | | $70.00 - $130.00 per Hour |
| 26" | 180 | 24000 | 26.85 | 12.73 | 33.60 | 7.20 | **80.37** | | | | | |
| DUMP WAGON | Life = 15 | | Annual Hours Use = 100 | | | | Annual Repair Rate = 2% | Replace Cost | | | | |
| Small (700 cu ft) | 0 | 8000 | 10.00 | 1.60 | | | **11.60** | | | | | |
| Large (900 cu ft) | 0 | 11000 | 13.75 | 2.20 | | | **15.95** | | | | | |

400 Annual Hours of Tractor Use figures are used to determine above Power Unit Costs.

## BALING EQUIPMENT

| Implement | Tractor HP | Current Replace Cost $ | POWER UNIT OR SP UNIT Fixed Cost $/Hr | POWER UNIT OR SP UNIT Var Cost $/Hr | IMPLEMENT Fixed Cost $/Hr | IMPLEMENT Var Cost $/Hr | TOTAL Machine Cost $/Hr | TOTAL Machine Cost Bale/Hr | TOTAL Machine Cost $/Bale | Twine Cost $/Bale | Total Cost $/Bale | Labor $/ | Profit $/ | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BALERS (STANDARD)** | Life = 10 | | Annual Hours Use = 80 | | | | Annual Repair Rate = 3% Replace Cost | | | | | | | |
| Small 14" x 18" | 40 | 11000 | 6.38 | 2.80 | 21.31 | 4.12 | 34.62 | 200 | **0.17** | 0.08 | **0.25** | | | $.30 - $.35 per Bale |
| Large 16" x 18" | 60 | 14000 | 8.05 | 4.04 | 27.12 | 5.25 | 44.47 | 300 | **0.15** | 0.08 | **0.23** | | | |
| **LARGE ROUND** | Life = 12 | | Annual Hours Use = 60 | | | | Annual Repair Rate = 2% Replace Cost | | | | | | | |
| 800 Lb. Bale | 60 | 16000 | 8.05 | 4.04 | 37.33 | 5.33 | 54.76 | | | | | | | $4.50 - $6.00 per Bale |
| 1500 Lb. Bale | 60 | 19000 | 8.05 | 4.04 | 44.33 | 6.33 | 62.76 | | | | | | | |
| **BIG SQUARE** | Life = 10 | | Annual Hours Use = 150 | | | | Annual Repair Rate = 3% Replace Cost | | | | | | | |
| 1500-2000 Lb. Bale | 160 | 79000 | 24.16 | 11.96 | 81.63 | 15.80 | 133.55 | | | | | | | |
| **BALE WAGONS** | Life = 12 | | Annual Hours Use = 80 | | | | Annual Repair Rate = 3% Replace Cost | | | | | | | |
| SP 160 Bale DS | 40 | 75000 | 131.25 | 28.12 | | | 159.37 | 400 | **0.40** | 0.00 | **0.40** | | | $.25 - $.30 per Bale |
| PULL 142 Bale | 80 | 28000 | 10.07 | 5.18 | 49.00 | 10.50 | 74.75 | 300 | **0.25** | 0.00 | **0.25** | | | |
| PULL 104 Bale | 60 | 22000 | 8.05 | 4.04 | 38.50 | 8.25 | 58.85 | 240 | **0.25** | 0.00 | **0.25** | | | |
| PULL 55 Bale | 40 | 15000 | 6.38 | 2.80 | 26.25 | 5.62 | 41.06 | 160 | **0.26** | 0.00 | **0.26** | | | |
| **STACKERS** | Life = 12 | | Annual Hours Use = 80 | | | | Annual Repair Rate = 3% Replace Cost | | | | | | | |
| 4 ton Rectangular | 80 | 20000 | 10.07 | 5.18 | 35.00 | 7.50 | 57.75 | | | | | | | |
| 8 ton Rectangular | 120 | 28000 | 20.13 | 9.33 | 49.00 | 10.50 | 88.96 | | | | | | | |

400 Annual Hours of Tractor Use figures are used to determine above Power Unit Costs.

## COMBINES

Years Life = 13
Annual Use = 100, 150*, 200
Annual Repair Rate = 3% of Replacement Cost

| Combine Cylinder Width | Annual Hours Use | Current Replace Cost $ | POWER UNIT OR SP UNIT Fixed Cost $/Hr | POWER UNIT OR SP UNIT Variable Cost $/Hr | PTO MACHINE Fixed Cost $/Hr | PTO MACHINE Variable Cost $/Hr | TOTAL Machine Cost $/Hr | TOTAL Machine Cost Ac/Hr | TOTAL Machine Cost $/Acre | Labor $/ | Profit $/ | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POWER TAKE OFF | 100 | | | | 56.38 | | 94.24 | | 15.71 | | | |
| 44-50 IN CYLINDER | 150 | 42000 | 20.13 | 9.33 | 37.58 | 8.40 | 75.45 | 6.0 | 12.57 | | | |
| (Tractor HP = 120) | 200 | | | | 28.19 | | 66.05 | | 11.01 | | | |
| LARGE PTO | 100 | | | | 91.28 | | 144.45 | | 16.99 | | | |
| JD7721,CASE1682,VERS | 150 | 68000 | 26.85 | 12.73 | 60.85 | 13.60 | 114.02 | 8.5 | 13.41 | | | |
| (Tractor HP = 180) | 200 | | | | 45.64 | | 98.81 | | 11.62 | | | |
| SP DIESEL | 100 | | 96.65 | | | | 114.84 | | 20.88 | | | |
| 45 INCH | 150 | 72000 | 64.43 | 18.19 | | | 82.63 | 5.5 | 15.02 | | | |
| (HP = 100) | 200 | | 48.32 | | | | 66.52 | | 12.09 | | | |
| SP DIESEL | 100 | | 118.12 | | | | 140.55 | | 21.62 | | | |
| 50 INCH | 150 | 88000 | 78.75 | 22.43 | | | 101.18 | 6.5 | 15.57 | | | |
| (HP = 120) | 200 | | 59.06 | | | | 81.49 | | 12.54 | | | |
| SP DIESEL | 100 | | 134.23 | | | | 159.75 | | 18.79 | | | $10.00 - |
| 60 INCH | 150 | 100000 | 89.49 | 25.52 | | | 115.01 | 8.5 | 13.53 | | | $13.00 |
| (HP = 140) | 200 | | 67.12 | | | | 92.64 | | 10.90 | | | per |
| ROTARY TYPE | 100 | | 114.10 | | | | 136.62 | | 19.52 | | | Acre |
| (SMALL) | 150 | 85000 | 76.06 | 22.52 | | | 98.58 | 7.0 | 14.08 | | | |
| | 200 | | 57.05 | | | | 79.57 | | 11.37 | | | |
| ROTARY TYPE | 100 | | 148.63 | | | | 175.50 | | 20.65 | | | |
| (MEDIUM) (HP = 175) | 150 | 115000 | 99.09 | 26.86 | | | 125.95 | 8.5 | 14.82 | | | |
| | 200 | | 74.32 | | | | 101.18 | | 11.90 | | | |
| ROTARY TYPE | 100 | | 170.47 | | | | 202.60 | | 21.33 | | | |
| (LARGE) (HP = 185) | 150 | 127000 | 113.65 | 32.13 | | | 145.78 | 9.5 | 15.34 | | | |
| | 200 | | 85.24 | | | | 117.36 | | 12.35 | | | |
| ROTARY TYPE | 100 | | 194.63 | | | | 232.26 | | 22.12 | | | |
| (LARGEST) (HP = 250) | 150 | 145000 | 129.76 | 37.63 | | | 167.38 | 10.5 | 15.94 | | | |
| | 200 | | 97.32 | | | | 134.94 | | 12.85 | | | |

* This Annual Hours Use figure is typical.
400 Annual Hours of Tractor Use figures are used to determine above Power Unit Costs.

| Implement | Tractor HP | Current Replace Cost $ | POWER UNIT OR SP UNIT Fixed Cost $/Hr | POWER UNIT OR SP UNIT Variable Cost $/Hr | IMPLEMENT Fixed Cost $/Hr | IMPLEMENT Variable Cost $/Hr | TOTAL Machine Cost $/Hr | Tonnes/Hr | $/Tonne | Labor $/ | Profit $/ | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TUB GRINDER | Life = 12 | | Annual Hours Use = 80 | | | Annual Repair Rate = 3% | Replace Cost | | | | | |
| 15 Tonnes/Hour | 80 | 14000 | 10.07 | 5.18 | 24.50 | 5.25 | 45.00 | 15.0 | 3.00 | | | |
| 25 Tonnes/Hour | 140 | 22000 | 21.81 | 10.40 | 38.50 | 8.25 | 78.96 | 25.0 | 3.16 | | | |
| PORTABLE GRINDER/MIX | Life = 10 | | Annual Hours Use = 80 | | | Annual Repair Rate = 3% | Replace Cost | | | | | |
| 20" Screen | 80 | 11000 | 10.07 | 5.18 | 21.31 | 4.12 | 40.69 | | | | | |
| 24" Screen & Bale Shredder | 100 | 16000 | 17.79 | 7.77 | 31.00 | 6.00 | 62.56 | | | | | |

| GRAIN DRYERS | Life = 12 | Annual Hours Use = 200 | Annual Repair Rate = 3% | Moisture Drop 20-14% $/Tonne | Moisture Drop 17.5-14% $/Tonne |
|---|---|---|---|---|---|
| RECIRCULATING BATCH | | | | | |
| Small<br>Propane = 37 L/Hr | 40 | 11500 | 25.62 | 19.70<br>(1.3T/Hr) | 12.81<br>(2.0T/Hr) |
| Medium<br>Propane = 46 L/Hr | 40 | 18000 | 32.76 | 19.27<br>(1.7T/Hr) | 12.60<br>(2.6T/Hr) |
| Large<br>Propane = 90 L/Hr | 40 | 28000 | 49.18 | 12.30<br>(4.0T/Hr) | 8.20<br>(6.0T/Hr) |
| CONTINUOUS FLOW | | | | | |
| Small<br>Propane = 90 L/Hr | 40 | 20000 | 42.38 | 12.84<br>(3.3T/Hr) | 8.15<br>(5.2T/Hr) |
| Medium<br>Propane = 110 L/Hr | 40 | 28000 | 52.78 | 12.00<br>(4.4T/Hr) | 7.54<br>(7.0T/Hr) |
| Large<br>Propane = 145 L/Hr | 40 | 48000 | 76.08 | 11.70<br>(6.5T/Hr) | 7.76<br>(9.8T/Hr) |

400 Annual Hours of Tractor Use is used to determine above Power Unit Costs.

## FARM TRUCKS, ROCK PICKERS & VACUVATORS

Years Life = 15
Annual Use = 150, 300*, 450
Annual Repair Rate = 3% of Replacement Cost

| Truck Size | Annual Hours Used | Fuel Use litres/Hr | Current Replace Cost $ | Fixed Cost $/Hr | Variable Cost $/Hr | TOTAL Truck Cost $/Hr | Labor $/Hr | Profit $/ | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|
| GENERAL TRUCKING | Life = 15 | Annual Hours Use = 150 | | Annual Repair Rate = 3% of Replacement Cost | | | | | |
| | 150 | | | 17.50 | | 25.81 | | | |
| 2 Ton | 300 | 30.00 | 21000 | 8.75 | 8.31 | 17.06 | | | |
| | 450 | | | 5.83 | | 14.14 | | | |
| | 150 | | | 23.33 | | 33.79 | | | |
| 3 Ton | 300 | 37.00 | 28000 | 11.67 | 10.46 | 22.13 | | | $4.50 - $7.50 per tonne (Short Haul) |
| | 450 | | | 7.78 | | 18.24 | | | |
| | 150 | | | 27.50 | | 40.11 | | | |
| 4 Ton | 300 | 45.00 | 33000 | 13.75 | 12.61 | 26.36 | | | |
| | 450 | | | 9.17 | | 21.78 | | | |
| | 150 | | | 32.50 | | 47.16 | | | |
| 5 Ton | 300 | 52.00 | 39000 | 16.25 | 14.66 | 30.91 | | | |
| Tandem | 450 | | | 10.83 | | 25.50 | | | |

* This Annual Hours Use figure is typical.

| Implement | Tractor HP | Current Replace Cost $ | POWER UNIT OR SP UNIT Fixed Cost $/Hr | POWER UNIT OR SP UNIT Variable Cost $/Hr | IMPLEMENT Fixed Cost $/Hr | IMPLEMENT Variable Cost $/Hr | TOTAL Machine Cost $/Hr | TOTAL Machine Cost Acre/Hr | TOTAL Machine Cost $/Acre | Labor $/ | Profit $/ | Market Rate Survey 1987 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROCK PICKER | Life = 10 | | Annual Hours Use = 150 | | | Annual Repair Rate = 6% Replace Cost | | | | | | |
| REEL TYPE | 60 | 7500 | 8.05 | 4.04 | 7.75 | 3.00 | 22.85 | | | | | $35.00 - $90.00 per Hour |
| ROCK RAKE | 60 | 5900 | 8.05 | 4.04 | 6.10 | 2.36 | 20.55 | | | | | |
| RAKE - PICKER COMBO | 80 | 12500 | 10.07 | 5.18 | 12.92 | 5.00 | 33.17 | | | | | |
| VACUVATORS | Life = 15 | | Annual Hours Use = 150 | | | Annual Repair Rate = 3% Replace Cost | | | | | | |
| SMALL | 80 | 8500 | 10.07 | 5.18 | 7.08 | 1.70 | 24.03 | 700 bu | 0.034 bu | | | |
| LARGE | 100 | 16000 | 17.79 | 7.77 | 13.33 | 3.20 | 42.09 | 1800 bu | 0.023 bu | | | |

400 Annual Hours of Tractor Use figures are used to determine above Power Unit Costs.

## MACHINERY COST WORKSHEET

**Machine**.....**Original Cost**.....**Annual Hours of Use**.....

**Replacement Cost** .....**Sale Value**.....**Years of Use**.....

| | | | Yearly Cost | Hourly Cost |
|---|---|---|---|---|
| **FIXED COSTS (Calculated on Yearly Basis)** | | | | |
| 1. Depreciation | = (Replacement Cost - Cash Sale Value) / Years of Use | $..... - $..... / .....Years | $ _____ | |
| 2. Investment Cost | = (Original Cash Cost + Cash Sale Value) / 2 X Interest Rate | $..... + $..... / 2 X .....% | $ _____ | |
| 3. Insurance & Housing | = Original Cash Cost X 1% | $..... X .....% | $ _____ | |
| 4. TOTAL FIXED COSTS PER YEAR | | | $ _____ (A) | |
| 5. TOTAL FIXED COSTS/HOUR | = Total Costs/Year/Hours of Annual Use | $..... ÷ $.....hr | | $ _____ (B) |
| **VARIABLE COSTS (Calculated on Hourly Basis)** (use following formulas if actual costs are not known) | | | | |
| 1. Fuel Cost | = Litre/Hour X Price/Litre | ..... X $..... X | $_____ | |
| 2. Lubrication | = Fuel Cost X 15% | $..... X .....% | $_____ | |
| 3. Repairs | = Original Purchase Price X Annual Repair Rate / Hours of Annual Use | $..... X .....% / .....hrs | $ _____ | |
| 4. TOTAL VARIABLE COSTS PER HOUR | | | | $ _____ (C) |
| 5. TOTAL VARIABLE COSTS PER YEAR | = Total Variable Costs/Hour X Hours of Annual Use | $..... X .....hr | $ _____ (D) | |

| | | | |
|---|---|---|---|
| TOTAL COSTS PER YEAR (A+D) = | $..... + $..... | $ _____ | |
| TOTAL COSTS PER HOUR (B+C) = | $..... + $..... | | $ _____ |

## MACHINERY CUSTOM CHARGE WORKSHEET[1]

Operation ..... Power Unit ..... Implement(s) ..... Acres/Hour .....

| | Power Unit | Machine 1 | Machine 2 |
|---|---|---|---|
| **FIXED COSTS PER HOUR[2]** | | | |
| A. Depreciation | $ _____ | $ _____ | $ _____ |
| B. Investment Cost | $ _____ | $ _____ | $ _____ |
| C. Insurance & Housing | $ _____ | $ _____ | $ _____ |
| D. Total Fixed Cost (A+B+C) | $ _____ (P) | $ _____ (R) | $ _____ (S) |
| E. Total Fixed Machine(s) Costs (P+R+S) | | | $ _____ (E) |
| **VARIABLE COSTS PER HOUR[3]** | | | |
| F. Fuel Cost | $ _____ | | |
| G. Lubrication | $ _____ | $ _____ | $ _____ |
| H. Repairs | $ _____ | $ _____ | $ _____ |
| I. Total Variable Cost (F+G+H) | $ _____ (T) | $ _____ (U) | $ _____ (V) |
| J. Total Variable Machine Cost (T+U+V) | | | $ _____ (J) |
| K. TOTAL MACHINE COST PER HOUR (E+J) | | $ _____ (K) | |
| L. LABOR COST PER HOUR | | $ _____ (L) | |
| M. PROFIT MARGIN (20-50% of Variable Cost + Labor) | | $ _____ (M) | |
| N. FULL COST + PROFIT (K+L+M) | | $ _____ (N) | |
| O. TOTAL CHARGE/ACRE (N : Acres/Hour) | | $ _____ | |

1 Before using this worksheet, calculate the costs of each machine using the "Machinery Cost Worksheet".
2 Refer to Machinery Cost Worksheet and divide by annual hours of use.
3 Refer to Machinery Cost Worksheet.

## FUEL CONSUMPTION FOR VARYING TRACTOR HORSEPOWER[1]

| TRACTOR TYPE AND SIZE | AVERAGE DRAWBAR HORSEPOWER[2] | | AV. FUEL CONSUMPTION[3] (Litres per Hour) | |
|---|---|---|---|---|
| | Diesel Tractors | Gasoline Tractors | Diesel Tractors | Gasoline Tractors |
| Two Wheel Drive PTO HP | | | | |
| 30 - 39 | .... | 31.5 | .... | 10.5 |
| 40 - 49 | .... | 38.3 | .... | 12.3 |
| 50 - 59 | 48.2 | 47.1 | 10.5 | 15.0 |
| 60 - 69 | 56.2 | 55.2 | 13.6 | 20.0 |
| 70 - 79 | 65.5 | 64.5 | 16.4 | 23.2 |
| 89 - 89 | 73.5 | 74.5 | 17.7 | 26.8 |
| 90 - 99 | 84.0 | 82.0 | 20.5 | 28.2 |
| 100 - 119 | 90.3 | .... | 22.7 | .... |
| 120 - 139 | 111.6 | .... | 28.2 | .... |
| 140 - 159 | 128.9 | .... | 32.3 | .... |
| 160 - 179 | 145.8 | .... | 38.6 | .... |
| Over 180 | 148.9 | .... | 39.1 | .... |
| Four Wheel Drive DBHP | | | | |
| 100 - 149 | 135.0 | .... | 33.2 | .... |
| 150 - 174 | 159.4 | .... | 40.3 | .... |
| 175 - 199 | 182.8 | .... | 50.0 | .... |
| 200 - 224 | 217.4 | .... | 53.0 | .... |
| 225 - 249 | 235.5 | .... | 58.0 | .... |
| 250 - 274 | 265.0 | .... | 61.4 | .... |
| 275 - 299 | 281.3 | .... | 62.6 | .... |
| 300 - 349 * | 305.0 | .... | 66.4 | .... |
| Over 350 * | 385.0 | .... | 92.4 | .... |

* Includes only one tractor

NOTES ON FUEL CONSUMPTION TABLE

This data on fuel consumption for different sizes of tractors was calculated from the Nebraska Tractor Tests Reports. The fuel consumption figures are based on "75% of Pull at Maximum Power". These fuel consumption figures are for tractors under normal load in average field conditions. Fuel use per hour will be affected by:-

- load factor (75% is assumed in these estimates
- engine RPM
- gear
- correct engine tuning

While these figures may be a good indication of fuel use per hour for a machine, fuel consumption per acre will be affected by the Field Efficiency related to each operation. Estimation of total fuel consumption should take this factor into account. Some factors that can significantly affect field efficiency include:-

- wheel slippage
- tire pressure
- tractor ballast
- depth of and sharpness of implement
- soil type and condition
- amount of turning required
- implement overlap in each pass
- down time to refill seed and fertilizer boxes

1 This data was summarized from "Nebraska Tractor Test Summary 1972 through 1981", The Grain Grower, Page 762 (UGG), April, 1982 and from 1980 - 1981, Agricultural Yearbook, A.S.A.E, May, 1980, pp 537-545.
2 Average Drawbar Horsepower for all tractors in each range.
3 Average fuel consumption for all tractors in each range.

# MACHINERY COSTS ASSUMPTION GUIDE

| MACHINE | A Depreciation Lifetime (Years) | B Annual Use (Hours) | C Annual Repair rate % orig.Cost | D Lifetime Repairs % orig.Cost | E Field Efficiency |
|---|---|---|---|---|---|
| Tractors | 13 | 600 | 3% | 120% | ..... |
| Combines | 12 | 150 | 3% | 60% | 60 - 80% |
| Cultivators | 15 | 250 | 3-8% | 120% | 70 - 90% |
| Discers | 15 | 150 | 3% | 120% | 70 - 90% |
| Rodweeders | 15 | 100 | 2% | 100% | 70 - 90% |
| Seed Drills | 15 | 100 | 2% | 100% | 65 - 80% |
| Harrows, Packers | 15 | 40 | 2% | 120% | 70 - 90% |
| Sprayers | 15 | 50 | 2% | 80% | 50 - 80% |
| Stone Pickers | 15 | 40 | 2% | 100% | 50 - 80% |
| Swathers | 15 | 100 | 3% | 95% | 70 - 85% |
| Mowers & Rakes | 15 | 50 | 2% | 100% | 60 - 90% |
| Mower-Condtioner | 15 | 50 | 2% | 100% | 60 - 85% |
| Forage Harvester | 15 | 80 | 3% | 80% | 50 - 80% |
| Balers | | | | | |
| Standard | 10 | 80 | 3% | 80% | 60 - 85% |
| Large Round | 12 | 60 | 2% | 60 | 60 - 85% |
| Grain Dryers | 12 | 200 | 3% | ... | ..... |
| Loaders | 15 | 40 | 2% | 90% | ..... |

NOTES ON COLUMN HEADINGS

A. Estimated average number of years until a machine depreciates to 10% of original cash cost.

B. Estimated average annual farm use.

C. Estimates are based on average conditions and the indicated annual hours of use.

D. Total repairs as a percent of the original cash cost. Repairs are usually low in the first years before they begin to increase at an increasing rate as the machine wears out. These figures could be viewed as a maximum since they reflect high rates in later years.

E. Field Efficiency is a percentage estimate of the amount of time machinery is actually in use relative to the total time required to complete an operation (refer also opposite page).

**ACRES PER HOUR**

Acres per hour (or "Effective Field Capacity") can be calculated using the following formula:-

$$\text{Acres per hour (Effective field Capacity)} = \frac{\text{machine width (ft)} \times \text{speed (mph)} \times \text{field efficiency}}{8.25}$$

E.G. A 31' cultivator travelling at 5 m.p.h. operating at 80% field efficiency would have an effective field capacity of:-

$$\text{Acres per hour} = \frac{31 \times 5 \times .80}{8.25} = 15 \text{ ac/hr}$$